Name _____

STUDY GUIDE Chapter 12: DNA and Chromosomes

1. The process whereby one strain of bacterium is apparently changed into another strain is called _____. This process was discovered by _____. Because of his experiment, _____, _____, and _____ were able to determine that the substance that was capable of transmitting the genetic information was DNA.

2. Using radioactive isotopes in viruses _____ and _____ confirmed that DNA, rather than protein, is the genetic material of cells. _____ and _____'s work with X ray diffraction showed patterns that indicated DNA's shape is a helix, which then allowed _____ and _____ to determine that the 3-D structure of DNA is a double helix.

3. The building blocks of nucleic acids are _____. In DNA, each building block is composed of one _____, one _____ group, and one _____ base. Chargaff determined that, in a given sample of DNA, the number of adenine bases is always equal to the number of _____ bases and the number of cytosine bases is always equal to the number of _____ bases.

4. DNA is composed of 2 strands that are _____ to each other with the 5' and 3' ends running in opposite directions. The backbone is composed of _____ and _____. The 2 strands are held together by weak _____ bonds between the complementary _____ bases.

5. _____ bonds with thymine and _____ bonds with guanine. So if 15% of a DNA sample is made up of guanine, _____% would be made up of cytosine, _____% would be made of up thymine, and _____% would be made up of adenine.

6. The proteins around which DNA coils are called _____. The complex consisting of DNA and histones is called _____. Each bead-like unit of chromatin is called a/an _____. The DNA wraps at several levels, compacting into a _____.

7. DNA replication is _____, as each replicated DNA molecule has one original strand and one new strand. The strands unwind and the enzyme _____ adds complementary bases to the template. After the sugar-phosphate backbones seal back up, the result is ____ DNA molecules that are _____ to each other and the original DNA molecule.

8. DNA replication occurs during the _____ phase of the cell cycle. In prokaryotes, replication occurs in the *cytoplasm* and starts from a _____ point on the DNA. However, in eukaryotes, it occurs simultaneously from _____ starting points on the DNA, which is found in the *nucleus*.

9. Locally opened portions of the DNA double helix are called _____. DNA replication proceeds in a _____ to _____ direction, so replication on one strand is continuous but the other is discontinuous, producing small pieces called _____ fragments.

10. The entire set of genetic information that an organism carries in its DNA is its _____. A chromosome chart that shows the diploid set of chromosomes is called a _____, which groups chromosomes in pairs in order of _____ size.

11. Normal human diploid zygotes contain _____ total chromosomes. A typical female's sex chromosomes are _____ while a male's are _____.

12. Typically, an individual with Down syndrome has _____ total chromosomes, and individual with Turner syndrome has _____ total chromosomes, and an individual with Klinefelter syndrome has _____ total chromosomes.

13. _____ is when homologous chromosomes do not separate properly, resulting in an abnormal chromosome number. This error occurs in _____ of meiosis. _____ is when there is an extra chromosome in the cells and _____ is when the cells are missing one chromosome.

14. Explain 3 genetic disorders that could result from the nondisjunction of autosomes.

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15. Explain 2 genetic disorders that could result from the nondisjunction of sex chromosomes.

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16. Trisomy 21 is more commonly known as _____. An individual with a single X chromosome has _____ syndrome and is considered female. An individual with 2 X chromosomes AND a Y chromosome has _____ syndrome and is considered male. Individuals with one Y chromosome and no _____ chromosome will not survive to birth!

17. An extra copy of part of a chromosome is known as a/an _____, the loss of part of a chromosome is called a/an _____, and a/an _____ reverses the direction of parts of the chromosome.

18. In a/an _____, part of one NON-homologous chromosome breaks off and attaches to another. In a/an _____, a larger sequence is inserted into a chromosome due to unequal crossing over during _____.

19. Given the normal sequence of genes on the chromosome below, classify the following chromosome abnormalities as a deletion, duplication, or inversion

Normal	a b c d e f g h i j k l m n
A. _____	a b c d e f g h i j k l m n l m n
B. _____	a b c d e k j i h g f l m n
C. _____	a b c d e f l m n

20. Given the following template strand of a DNA molecule, complete its complementary strand of DNA using the base pairing rules.

3' – A G C C T T G A C G T A T G C – 5'
5' – – 3'